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ABSTRACT

A review of historical and research literature presents various perspectives on the growing controversy surrounding the use of vitamin and mineral supplements to maintain good health and for preventive health care. Several points are made in opposition to many health professionals' opinions that most nutritional supplements are unnecessary. Considerations discussed include: (1) faulty definitions of health; (2) validity of nutrition research; (3) role of dogmatism among health professionals; (4) government policies and pronouncements; (5) propaganda and quackery; and (6) the notion of a well-balanced diet. It is concluded that, although the medical profession and most scientists strongly question the value of nutritional supplements, there is good reason to suspect that supplements might help most people. (CB)

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USING NUTRITION AGAINST AGING AND DEGENERATIVE DISEASE

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A DECLARATION OF INTENT

Before we get into this presentation, I would like to establish its intent. There is considerable disagreement among professionals in the field of nutrition over a wide range of issues (as there is in all professions), but one fundamental issue seems to rise above the others. It is the question of whether or not one should take nutritional supplements; i.e., vitamin pills (which might also contain minerals).

It is reasonably obvious from what we hear and read that a substantial majority of nutritionists, dieticians, physicians, as well as government agencies and professional bodies, believes that the taking of nutritional supplements is useless, at least for apparently healthy people, and that everything we need can be gotten from the food we eat, as long as we eat well-balanced diets. There appears to be good reason for such a claim, but it is based on several assumptions that are assailed by those on the other side of the issue. There are biochemists and physicians who vigorously support the taking of vitamin pills. Their conclusions are based upon what they must believe is sound research and clinical evidence, just as the other side's conclusions are based upon what they believe is sound research. Is one side's research better than the other side's research? I don't know. I'm not a nutritionist and am not qualified to judge. It may be that those in the field, themselves, have

difficulty in distinguishing between valid and invalid research.

Whatever the case, there is increasingly convincing evidence that vitamin supplementation is beneficial toward maximizing the length and health of our lives. There is, however, no absolute proof that this is so. More research needs to be done to reconcile conflicting results, but there is an increasing number of biochemists and physicians which has turned to nutritional therapy for patients and maladies that do not respond to conventional doctoring. They have also come to believe that the taking of vitamin pills would go a long way toward the prevention of many maladies in the first place.

I take vitamin pills, along with the other eighty million people in this country who do so on a daily basis. That's one-third of the population. Are we naive, hapless dolts, suckered by the false claims of the health food industry? I think not. Anyone who says that there is NO evidence to support the taking of vitamin pills is either misinformed or grossly bending the truth. There is plenty of research, clinical observation, and reasoned opinion which indicates that nutritional supplementation can be useful to the vast majority of the population.

My ultimate intent with this presentation is not to prove to you that you should be taking vitamin pills, because such proof does not exist. Instead, I want to present to you

a summary of the evidence and reasoning that some scientists and physicians are promoting as a strong indication that supplements should be taken, even in the absence of absolute proof. Hopefully, I can stimulate you to read what I've read, and you can come to your own informed conclusion after viewing both sides of the story.

The books listed in the bibliography were written by biochemists and physicians. As far as I can tell, the authors are not quacks, and they have no financial stake in the sale of nutritional supplements. They are just trying to present what they believe to be the truth.

SOME INTRODUCTORY THOUGHTS

Before getting into the nutritional supplement controversy itself, it might be worthwhile to introduce several terms and thoughts.

THE NUTRIENTS AND THEIR CHARACTERISTICS

In order to survive, man has several environmental requirements. He needs appropriate air pressure, temperature, oxygen content of air, and the availability of food and water. Food contains nutrients, and they can be classified as being either macro or micro. Macro nutrients are fat, protein, and carbohydrate, as well as water. Micro nutrients are vitamins and minerals.

There are more than forty known nutrients that the body needs to one degree or another, and it is likely that there

are others in food which have yet to be identified. Experiments have been done which indicate this. When animals are raised on purely synthetic diets, containing all the known nutrients, they appear to live and grow in a manner similar to those animals raised on natural food. However, the "synthetic" group does not reproduce as well. It is theorized that there is something in the natural food that has yet to be isolated. One of the last nutrient discoveries was made by Dr. Roger Williams, a biochemist at the University of Texas, and the author of several books on nutrition. He discovered pantothenic acid (vitamin B-5).

For the most part, nutrients do not act independently. They work as a team. So, the presence or absence of one nutrient can affect the performance capabilities of others. One could be diagnosed as having a vitamin A deficiency, when, in fact, the real deficiency is zinc. Zinc is required for the release of vitamin A stored in the liver. Furthermore, the complete absence of a nutrient eventually results in death. If vitamin C is missing from our diets, we die within a few months. But, we could live years without vitamin B-12 and still longer without vitamin E. In some cases, the body can even make up for a dietary deficiency of a nutrient by manufacturing its own supply. Several of the B vitamins can be produced in the intestines; and, when dietary niacin (vitamin B-3) is low and sufficient tryptophan (an amino acid) is present, the body can convert the tryptophan into niacin. Vitamin A is found in animal products, but a

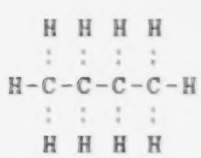
substantial percentage of the body's supply of vitamin A comes from plants, even though there is no vitamin A in plants. What is in plants is carotene, which the body converts into vitamin A.

Nutrients function in the body in three basic ways: (1) involvement in the regulation of metabolic processes, (2) tissue growth, maintenance and repair, and (3) provision of energy (carbohydrate and protein yield four calories per gram, and fat yields nine calories per gram).

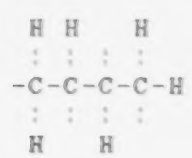
Sugars and starches are classified as carbohydrate, with starch being a more complex molecule than sugar. Carbohydrate is broken down by the body into the blood sugar glucose. Excess carbohydrate intake is stored as glycogen in the muscles and liver and is called upon during exercise. Any further excess is stored as body fat.

Fat is usually identified as being either saturated or unsaturated. Saturated fat is solid at room temperature, and unsaturated is liquid in the form of oil. However, there is no such thing as a fat that is purely saturated or unsaturated. All fat is made up of some combination of saturated and unsaturated fatty acids. When the unsaturated fatty acids predominate, the fat is visible as liquid. The molecular structures are illustrated on the next page. Note that a fatty acid is a chain of carbon atoms with hydrogen atoms attached. When all the hydrogen spaces are filled, the fatty acid is saturated. When spaces are open, the fatty acid is unsaturated.

SATURATED FATTY ACID



UNSATURATED FATTY ACID



Protein is the most plentiful substance in the body, except for water (water is 55% of the body). It consists of twenty-two amino acids, eight of which must be gotten from food (others are made in the body). The body's muscles, skin, hair, organs and other structures consist mainly of protein. For protein synthesis to take place in the body, all twenty-two amino acids must be present in the correct proportions. Only one pattern is usable by the body. The small presence of just one amino acid lowers protein synthesis by the amount of deviation from that required. One is only as strong as the weakest link. If one amino acid is completely missing, no protein can be made.

One myth about protein that needs to be dispelled is the idea that one needs to eat meat to get high quality protein. That's not true at all. Protein is protein as long as all twenty-two amino acids are present in the right proportions. One gram of fully utilizable egg protein equals one gram of fully utilizable meat protein. Where differences come in is when you consider how much protein weight is actually utilizable. For example, 94% of the protein found in the egg is utilizable by the body for protein synthesis, whereas only 67% of meat protein is fully utilizable. However, the actual

quantity of protein in meat is greater than that of the egg. So, the egg is higher in protein quality but lower in protein quantity.

As far as the vitamins and minerals go, one could spend much time detailing the functions and food sources of each nutrient. The functions of some vitamins and minerals will be discussed as we talk about degenerative disease. To know the food sources of each nutrient is relatively unimportant, because so many nutrients are found in so many foods in so many different combinations that it becomes something of a waste of time to keep track of it. For example, carrots are usually identified as the source for vitamin A (carotene, actually). But carotene can be found in all sorts of foods, and carrots are good sources for many other nutrients. The point is that as long as you eat good food in reasonable variety, you will get a good combination of all the nutrients.

WHY SHOULD WE BE CONCERNED WITH NUTRITION, ANYWAY?

We've all heard the saying - "You are what you eat" - and it is literally true. There is nothing in our bodies which is not built from the nutrients in food. Many animal and human studies have been done which show that how well one grows, looks, feels, functions, and the length of one's life depend on the nutritional status of the body's cells. Healthy cells equal a healthy body. Many, if not all, of man's infectious and degenerative diseases are thought to be

linked to nutritional deficiencies. Degenerative disease refers to conditions, such as heart disease and cancer, which develop over the years, whereas infections come and go relatively quickly.

Aside from commonly recognized degenerative diseases, nutrition affects aspects of our lives which we may not consider as being disease. Behavior and mental disorders have nutritional connections. It has been found in experiments that poorly nourished animals become unkempt -- they stop grooming themselves. They also don't get along with each other, with fighting and killing being commonplace. When nourished, the opposite is true. Hyperactivity in some children can be turned on and off like a faucet with the feeding or withholding of sugar and chemical additives. Mental conditions, such as insanity, depression, anxiety, schizophrenia, and forgetfulness have nutritional bases; and all have been known to respond to nutritional therapy. There is even evidence to support the relationship between poor nutrition and criminal behavior.

THE MISTAKES OF HISTORY

Over the course of history there have been several food handling mistakes which dramatically illustrate the effects of nutrition on health.

The staple food of the Orient for many centuries has been rice. Whole rice stored in hot and humid climates becomes weevil infested, thus inedible. To solve that

problem, a method of refining the rice into what is now known as white rice was established. Weevils won't eat white rice because it won't support life. Therefore, white rice can be stored. The reason white rice doesn't support life is simple. Much of the nutrition of the original grain is removed. The largest deficiency involves thiamine (vitamin B-1). About 75% of thiamine is lost in the refining process. Since rice was consumed as a staple food, many people contracted beriberi (vitamin B-1 deficiency), and many of those people died.

In the early 1900's corn became a staple food in the southern United States. Poor people couldn't afford to eat anything else. Corn, however, is substantially deficient in niacin (vitamin B-3), and pellagra results from its deficiency. Many southerners contracted pellagra, with one of its symptoms being a redness of the skin. Since poor white people worked in the fields, the backs of their necks would get even redder from exposure to the sun. It was from this combination of events that the term "redneck" evolved.

Throughout history there has been a need to preserve food for storage and transportation. The drying of food was used for many years; but when dried in the presence of air, vitamin C is completely lost from the food. People, such as sailors, who relied on dried foods for long periods, commonly contracted scurvy, which is characterized by skin and gum problems and eventual death. In the 1700's a British

physician discovered that the feeding of citrus fruits to British sailors prevented scurvy from occurring. One of the fruits eaten was the lime, and the British, since then, have often been referred to as "limeys."

Some researchers think we are currently involved in a far-reaching series of food handling mistakes. The major portion of the civilized world has given up its age-old responsibility for growing and gathering its own food. That job has been turned over to what has become known as the food industry. The original concern of the food industry was to get food to the consumer before it spoiled. But, that has since degenerated into a concern for providing food that can be quickly prepared and is fun to eat - food that looks good, smells good, and tastes good. So, the food industry has given us processed food which has nutrients taken out of it, artificial ingredients put into it, and in some cases, molecular structures rearranged. Sugar is extracted from sugar cane and beets and is injected into virtually everything that is packaged for sale. Even fresh fruits and vegetables might contain colorings, pesticides, and herbicides. And, frozen and canned vegetables and fruits have been processed in such a way that their shelf lives are improved, but their nutritional contents are lessened relative to their original statuses.

The results of all the nutritionally deficient food we eat are not as clear cut as those from the other food handling mistakes mentioned previously. Since no one food is consumed as a staple, no one nutrient is grossly deficient in our diets. Therefore, no one specific, identifiable disease results from our way of eating. But, just as beriberi results from a thiamine deficiency, heart disease, cancer, diabetes, and arthritis are diseases which seem to have generalized nutritional connections. As we shall see later, degenerative disease is not some inevitable happenstance. It is the direct result of the way we eat and live.

THE MAJOR ISSUE

As previously stated, the one fundamental issue in nutrition today involves the worth of nutritional supplements. Why do most professionals say that supplements are not necessary, that they are probably outright useless for what we might call normal healthy people, and that they might even be harmful? Obviously, the preponderance of the research and reasoned opinion must indicate that one can live a normal, healthy life by eating a well-balanced diet. That conclusion is very likely based on several faulty assumptions, however, and is influenced by factors that tend to skew people's judgments in that direction. In support of that charge, there are six major points to be made, and they will be discussed in some detail.

POINT NUMBER ONE: OUR DEFINITION OF HEALTH IS PROBABLY FAULTY

Perhaps the biggest source of misinformation involved with the vitamin pill issue is a definition of what health really is. It is not simply the absence of obvious disease. There are many levels of functionability between death and optimal health. You can have a vitamin C deficiency without contracting scurvy. Yet, the medical profession tends to recognize only the connection between scurvy and vitamin C, not the myriad of other, more subtle problems that can occur from vitamin C deficiency. Experiments have shown that animals need 20-100 times more nutrients for good health than the simple prevention of obvious disease. It is important to realize that diseases such as cancer and heart disease do not occur magically overnight. It's not as though one is happily walking along, and he suddenly falls off a cliff. Degenerative disease takes years and years to develop; and along the way, a person can easily be lulled into thinking that he is in good health, when in fact, he is not. He is just taking a longer, slower path to the bottom of the cliff.

In our country the average age at death is about seventy-three years (which ranks only eighteenth among all nations). Yet, it has been determined that one's genetic life span is about 110-120 years. That's a difference of forty-five years. Furthermore, people usually start deteriorating at around the age of forty, which means that thirty-three years of the average seventy-three are spent in

something other than optimal health. THIS IS A CRUCIAL POINT! Much depends on a person's own standards of how long and how well he/she wants or expects to live. Those standards are almost always too low. Right now, at least twenty-five million Americans suffer from some sort of chronic and disabling disease. We can do better.

Aging seems to occur in two basic pathways. One is the result of aging clocks. In essence, aging clocks shut down various systems in the body as a pre-determined genetic event. If the damaging effects of lifestyle could be perfectly repaired over and over, people could lead healthy, active lives to the end of their genetically determined lifespans. There would be minimal mental and physical deterioration toward death. People would tend to simply die suddenly in their sleep, as an aging clock shut off a crucial system of the body. There <u>are</u> groups of people living in the world today who demonstrate this phenomenon. The Hunzas, who live in the mountains of northern India, and the people who live in the Georgia region of Russia, are two such groups. They essentially live off the land and are touched by modern civilization only minimally. Their societies are not riddled with degenerative disease.

Heart disease, cancer, diabetes, arthritis, senility, and so forth, are all degenerative diseases which occur due to random damage events. Throughout life, the body's cells, tissues, and molecules are constantly experiencing damage.

The body has an immune system which attempts to protect the body from damaging agents and attempts to repair any damage that might have occurred. Random aging occurs when the repair mechanism cannot keep up with the rate of damage. Unfortunately, damage promotes more damage, and the body's immune system gradually declines in functionability as a result. So you end up with a snowball effect, where both elements of the damage/repair ratio are going in the wrong directions. Damage is on the increase while the body's ability to repair the damage is on the decrease. The actual rate of aging, then, increases as one gets older.

Let's take a brief look at some of the random damage mechanisms in the body. What do hardening of the arteries, muscular inflexibility, and wrinkling of the skin have in common? They are all the result of the same aging process, called cross-linking. Collagen is a protein in the body which serves as an intercellular glue. It holds the body together. When collagen is attacked by certain agents, and the immune system can't totally control the damage, undesirable chemical bonds occur between molecules, causing an inflexibility in the tissues at hand. It is well known that overexposure to sunlight (ultraviolet light) can cause not only skin cancer, but a premature wrinkling of the skin. Wrinkled skin has been cross-linked. A different chemical agent may cross-link the arteries, making them inflexible and

hard. When blood gets pumped through the vascular system, arteries need the flexibility to expand as the major thrusts of the blood flow periodically pass through. Hardened, brittle arteries don't have that flexibility, and they are susceptible to simply blowing out into, for example, a cerebral hemorrhage. As we've all experienced, our bodies become stiffer and less agile as we grow older. We cannot do the things that we once could, because cross-linked connective issue (tendons and muscle fascia) won't let us. Researchers have found that the cross-linking process can be largely prevented or slowed by supplying the body with the right nutrients in the right amounts.

Senility is a condition we associate with old age and consider to be virtually inevitable. It isn't. Neurotransmitters are chemicals in the brain which are made by the brain cells (neurons). Neurons communicate with each other through the passage of neurotransmitters from cell to cell. Everything we do -- learning, moving body parts, emotional feelings -- depends upon that process. Brain functions deteriorate when the brain's ability to make and use neurotransmitters decreases. Neurotransmitters are made from nutrients. Acetylcholine is made from the B vitamin choline, norepinephrine comes from the amino acids phenylalanine and tyrosine, and dopamine is made from the amino acid L-dopa. There are many other neurotransmitters and nutrients that are used to make them. Experiments show

that memory loss, apathy, and confusion, symptoms associated with senility, can be prevented and partially reversed by appropriate nutrition. Furthermore, the functions of the brain can be improved in supposedly healthy people. For example, in a study of MIT students who were given three grams of choline a day, it was found that their memories improved relative to a control group which did not get the choline.

Many people who are thought to be healthy, at least from a nutritional standpoint, are actually living in twilight zones. They are tired, nervous, constipated, psychologically insecure, have indigestion, headaches, and sleep disorders. Those are symptoms that usually can't be connected to any specific origin, but people (and many physicians) think that's a normal part of life. What they don't realize is that those symptoms are an indication that the body's cells are not being nourished sufficiently. Those symptoms are probably the forerunners of degenerative disease, which may reveal itself in no uncertain terms tomorrow or ten years from tomorrow.

For years and years most physicians have supported the well-balanced diet approach to health and are skeptical about the concept of seeking specific nutritional solutions to people's problems. There is a good reason for that. Doctors typically don't know much about nutrition. They don't have to take a nutrition class in medical school. They are taught

crisis medicine -- how to diagnose the overt symptoms of a condition and to prescribe drugs or perform surgery to remedy the situation. Aspirin is commonly prescribed for headaches. But the body's lack of aspirin isn't what's causing the headaches. The aspirin is just a quick fix for an underlying problem which often is not pursued.

One of the reasons that the medical establishment might shy away from nutritional therapy involves the complex and confusing ways that deficiency conditions manifest themselves. They develop in different ways in different people. Due to biochemical individuality and differences in genetic susceptibility, the same nutritional deficiencies may lead to eyesight problems in one person, headaches in another, and insomnia in yet another. Such confounding symptoms were clearly described by an eighteenth century physician as they relate to scurvy.

> This disease, so frequently attending all long voyages, and so particularly destructive to us, is surely the most singular and unaccountable of any that affects the human body. Its symptoms are inconstant and innumerable, and its progress and effects extremely irregular. Scarcely any two persons have the same complaints, and where there has been found some conformity in the symptoms, the order of their appearance has been totally different. However, it frequently puts on the form of many other diseases, and it is therefore not to be described by any exclusive and infallible criterions.

Obviously, it is difficult to determine what causes what, when it comes to nutrition and disease. Furthermore, there is no reliable laboratory method for determining a person's exact nutritional status. So, it is far easier to ignore the

relationship between nutrition and disease than to deal with it. And, that is what the medical profession has been doing for years. As nutritionist, Jean Mayer, says, "Our studies at Harvard suggest that the average physician knows a little more about nutrition than the average secretary -- unless the secretary has a weight problem. Then she probably knows more than the average physician."

Current medical thinking can be traced back to the second half of the nineteenth century. It was then that the "germ theory of disease" was largely developed by Louis Pasteur. He discovered that bacteria caused many of the infectious diseases that had plagued man for centuries. With the discovery of cures for one disease after another, the medical and research communities slipped into a thought process that pursued infection as being the source of virtually all human disease. However, certain conditions, such as scurvy, beriberi, pellagra, and rickets escaped categorization as disorders caused by infection. It wasn't until the early 1900's that some researchers theorized that those maladies must have some sort of nutritional connection. There must be something in food other than fat, protein, and carbohydrate -- something so minute that it escaped previous detection. The name given to the unknown substance was "vitamines", and it was theorized that its absence in the body could cause disease.

The scientific community eventually jumped on the idea and expended much research energy toward isolating individual

vitamins and relating them to specific needs in human metabolism. It was found that scurvy resulted from a deficiency of vitamin C, beriberi from a deficiency of B-1, pellagra from deficiency of B-3, and rickets from a vitamin D deficiency. The minimum vitamin concentrations necessary to prevent those diseases were also established. With this evidence in hand, researchers sought to go even further, attempting to cure such diseases as polio with supplemental vitamins, just as they had previously cured infections with antibiotics. After years of experimentation, though, they found that they couldn't; and by 1950, much of the scientific community had given up on the idea of using vitamins as "drugs" to cure specific diseases, other than those which could be identified as deficiency disorders. They concluded that nutritional intake beyond that which is necessary to prevent the recognized deficiency diseases had no effect on any other disease, and such intake was unnecessary. Scientific energies turned back to drugs as the fundamental avenue toward curing disease, and the notion that vitamin supplements are useful medical instruments has been largely buried ever since.

Although deaths from heart attacks have decreased in this country in recent years, the incidence of heart disease continues to rise. Deaths have decreased because heart disease is detected earlier, and better surgical procedures and other forms of rehabilitation are being employed. What

we need is prevention of the problem in the first place; and, as we shall see later, the medical profession's prevention plan for heart disease in incomplete. A researcher at Harvard recently (1986) concluded that we are losing the fight against cancer; that what we should be doing is concentrating on its prevention rather than its cure. It is important that physicians generally adopt that way of thinking, but I wonder if they will eventually conclude that superior nutrition is a large part of the answer.

I am not condemning the medical profession. They do good work within the limitations of their focus. What they need to do is expand their focus to include nutrition as a basis for the prevention and cure of infectious and degenerative disease. It was once said by the English clinician, Parry of Bath, that it is often "more important to know what kind of person has a disease than what kind of disease a person has." Throughout one's lifetime, a person's body is constantly being attacked by bacteria, viruses, free radicals, cancer cells, and a variety of damaging chemicals. If three people are exposed to the same germ, one might be unaffected, one might get a cold, and the other might get pneumonia. The differences lie in cellular nutrition.

The question that physicians should ask is this: are a person's cells nutritionally sound enough to allow the body to defend itself with its own immune system? The question you should ask is, am I satisfied with the idea that I am

statistically scheduled to die at the age of seventy-three while gradually deteriorating toward that death? Given the circumstances in which I live and the lifestyle to which I've become accustomed, is there anything I can do to extend my lifespan and improve my quality of health? Although one could reasonably argue that a change in lifestyle can contribute to improved health, one could also argue that the taking of nutritional supplements, with or without a change in lifestyle, can at least partially offset the aging processes that lead to degenerative disease and premature death.

POINT NUMBER TWO: THE VALIDITY OF SOME NUTRITION RESEARCH IS SUBJECT TO QUESTION

Mistakes in nutrition research are probably made all the time. Research studies commonly use too little of a nutrient for too short a time with the expectation of getting drug-like effects. Vitamins are not drugs. Although there are instances where the appropriate supply of a singular nutrient can achieve rather quick, dramatic results, nutrients typically don't work that way. They work in combination with each other over long periods of time -- months, years, and decades. Any improvements in health usually occur so subtly that they are almost imperceptible on a day to day basis. Since the metabolic efficiency of a cell is dependent upon the nutrient that is in least supply, i.e., a cell is only as strong as its weakest link, it is

improbable that the taking of high concentrations of a single nutrient will confer comprehensive health benefits. Heart disease, cancer, and arthritis are not caused by singular nutrient deficiencies. Rather, they are the result of a more generalized deficiency, with many, if not all, the nutrients being in less than optimal supply.

The question of whether or not vitamin C treatment can have any effect on cancer might illustrate the point. In the mid-1970's, Drs. Linus Pauling and Ewan Cameron conducted a study on terminal cancer patients in a Scottish hospital. One hundred patients received ten grams of vitamin C a day, and a control group of one thousand patients got a placebo. The control group survived only fifty days on the average, whereas, the experimental group averaged more than two hundred days, nearly four times as long. Thirteen of the one hundred are still alive today (as of 1982). None of the control group is. The vitamin C saved 13% of the people who would otherwise have died, and it prolonged the life of the others.

A group of researchers followed up on that study by doing its own. They found that vitamin C had no effect on cancer patients. However, Pauling discovered a flaw in the study. The researchers used patients who had undergone prior chemotherapy treatment. As a side effect, chemotherapy acts as a suppressing or destructive force on the body's natural immune system. Since vitamin C's major effect is to

stimulate the body's immune system, its activity against cancer becomes severely limited. In response to the criticism, the researchers corrected the error and conducted another study, designed to replicate the Pauling-Cameron study. Again, the results showed no effects. But Pauling again had criticism. According to Pauling, the researchers did not administer the treatment over the same period of time. They stopped the vitamin C much earlier than did Pauling and Cameron. Did the researchers make yet another mistake, or is there more to the treatment of cancer than just a single nutrient, or is the damage from cancer frequently irreversible with respect to nutritional therapy? All three could be true.

The food industry has a pervasive influence on what the public believes about nutrition and the food we eat. The industry seems to outright purchase information and testimony which is beneficial to the products it sells. Companies such as General Foods, Coca Cola, and Oscar Mayer spend a lot of money on research grants, professorial chairs, consultant-ships, political contributions, lobbies in Congress, advertising, and published propaganda. They want us to buy their products with the faith that consumption of those products is good for us, or at least not harmful. They are not particularly interested in our health, unless healthful products sell. They will do anything they have to do to maintain a good public image. They are in business to make

money. And, so is the one-billion-dollar-a-year health food industry. Nutritional supplement manufacturers probably do the same things to promote their products.

A significant portion of the nutrition research done in the United States is conducted or sponsored by the food industry. A professor at a university might design a study on some aspect of breakfast cereals, for instance. He submits it to General Mills for a research grant, and General Mills forks over several thousand dollars to do the study. This process is important to the professor, because his job substantially depends on his ability to attract research funds to the university. Is it likely that a professor, whose research funds are provided by General Mills, will determine and announce that commercially processed cereals are nutritionally unsound? Not if he ever again expects to receive funding from that, or similar, companies!

A specific example will illustrate the point. A well-known researcher and author and member of the faculty of Harvard's nutrition department has regularly defended the intake of sugar as being essentially harmless. He says that most people could healthfully double their daily sugar intake. The average yearly per capita sugar consumption in the United States is, by the way, one hundred twenty five pounds. Over the course of his career he has given favorable testimony to Congressional and Food and Drug Administration boards of inquiry in behalf of the Sugar Association, The

Cereal Institute, Kellogg, and Nabisco. He has sat on the boards of directors of several companies whose products he was charged with evaluating. In one way or another those associations and companies compensate him for rendering his judgments. What are the chances that those judgments are unbiased and based on independent research results?

In another example related to sugar, two researchers at Harvard published a paper in 1974 showing that presweetened cereals don't contribute to tooth decay. Kellogg Company sponsored the study, and it was designed in such a way that the connection between tooth decay and sugared cereals could never be established.

One big reason that a person could say that sugar consumption is basically harmless (except for persons who have diabetes or hypoglycemia), is that nothing obvious happens after you have eaten a candy bar. And even in the long term view, excess sugar consumption cannot be directly connected to any one specific degenerative disease. However, it can very well have an effect on the body, both short term and long term.

The short term effects of sugar can be as follows:

1. Bacteria in the body feed off sugar. There are heavy concentrations of bacteria in one's mouth, throat, and intestinal tract. Tooth decay can occur when the bacteria in the mouth release an acid which eats away at the tooth's enamel. Respiratory infections occur when

sugar-consuming bacteria grow in strength and overwhelm one's immune system. The same process can occur in the intestinal tract.

2. High sugar intake can cause overweight, especially in the absence of enough calorie-burning exercise to offset the calorie intake. Aside from that, several research studies have shown that carbohydrate turns into body fat more readily than protein or fat food. Furthermore, animals on sugary diets put on more fat weight than animals on starchy diets, given an equal number of calories.

   There are several problems with being overweight.

   a. In our society, an overweight person is less attractive than one who is not.

   b. Excess fat puts an extra burden on the muscles and bones, because that weight must be structurally supported and hauled around in movement. Related to that, a fat person is less quick and agile than he/she would otherwise be.

   c. Since fat cells must be nutritionally supported like other cells, an extra burden is placed on the heart to circulate blood over a larger area.

   d. Fat people have higher rates of cancer, heart disease, and infectious disease. Fat stored in the body is susceptible to oxidation, in the absence of sufficient nutrients to prevent the process.

      Oxidation occurs when fats are attacked by certain

chemicals, creating peroxidized fats (also called free radicals). The peroxidized fats do two harmful things to the body.

(1) They act as an immune system depressant, inhibiting the effectiveness of the white blood cells that neutralize bacteria, viruses, cancer cells, and other harmful substances.

(2) They cause damage directly by attacking cellular DNA which damages the function of the cell, outright killing it or causing cancer. Furthermore, they inhibit the production of PGI-2, a hormone that prevents abnormal blood clots in the arteries. Blood clots ultimately cause heart attacks and strokes. So, the overweight person is more susceptible to infection and degenerative disease than a thinner person.

The long term effects of sugar can be as follows:

1. The measure of a good food versus a bad food is the nutrient/calorie ratio. The more calories a food contains, the more nutrients are required to metabolize them. The more nutrients a food contains per calorie, the more nutrients are left over to supply the body's cells. Since sugar is devoid of nutrients, it offers nothing to the body and leaches nutrients (especially vitamins B and C) from the body's cells in order to metabolize it. Over a period of time the process becomes

a contributor to aging and degenerative disease, as the body's cells break down in function from a lack of nutrients.

2. When a high-sugar food is eaten, and assimilated into the bloodstream, it creates a high-blood-sugar situation which the body tries to bring back to normal. If a person persistently abuses the body's regulatory mechanism, there's a good chance it will break down over time. Hypoglycemia results (also called low blood sugar). What typically happens is that, after sugar is eaten, the malfunctioning system secretes too much insulin into the bloodstream to process the sugar into the cells. The blood sugar level falls below normal, giving the victim a feeling of fatigue and listlessness. The victim typically eats another high-sugar food, which elevates the blood sugar for a couple of hours and allows the victim to feel good again. However, low blood sugar results soon after. The victim is caught in a vicious cycle. The only way to stop it is to severely reduce one's carbohydrate intake over a period of months, eat good food, take nutritional supplements, and allow the body to heal itself.

One problem with sugar is that most people don't have a clue as to how much they take in every day. Beyond outright desserts, sugar is found almost everywhere in the processed food supply. Back in the 1940's cereal sales were lagging,

so companies started to sugar-up their cereals to make them taste better and sell better. Sugar is now found in breads, peanut butter, salad dressings, spaghetti sauce, and so forth. In order to avoid hidden sugar, one must read product labels.

The classic example of an industry buying research that suits its needs involves the tobacco industry. Although they don't produce a food item, they illustrate the point so clearly that it's worth our attention.

The evidence that the smoking of cigarettes is harmful is overwhelming. Virtually no one contests it, except the tobacco industry. They do everything they can (advertise, sponsor poorly designed research studies, lobby in Congress) to counter their increasingly bad image. Industry spokes-persons commonly cite "eminent researchers" who dispute claims that smoking is bad for your health. Conclusive evidence just isn't there, they say. The reason they can say that with half a straight face is the result of so much bad research that has been sponsored by the tobacco industry. It allows people to cite this study or that study in support of their contentions that the ill effects of smoking on health are not proven. The tobacco industry has to do this for survival.

Let's look at why people smoke and what it does to the human body. People usually start to smoke in their teenage years due to peer pressure. And even though it might appear

that smoking is of no real physiological value to the smoker, other than keeping him/her from overeating throughout the course of the day, it does have one supposedly beneficial effect. The nicotine in cigarette smoke is a stimulus barrier, making it easier for the smoker to shut out distractions. This has been indicated in human and animal studies. For example, rats given nicotine were not as responsive to heat as rats which did not get nicotine. Further, when a habitual smoker stops smoking cold turkey, his/her brain's response to stimuli (as measured by electroencephalograph electrodes on the head) becomes greater than it would have been if smoking were never begun in the first place. That makes it even more difficult for the ex-smoker to concentrate.

Smoke contains many chemicals that harm the body in several ways. The specific effects of smoking are as follows.

1. Nicotine constricts the blood vessels, increasing blood pressure and making the heart work harder to supply the body's cells. It also causes an increase in blood lipids (fats).
2. Carbon monoxide in smoke creates an hypoxic (low oxygen) state by binding with hemoglobin in place of oxygen. Hypoxia generates free radicals, which are reactive molecules that can damage artery walls. Carbon monoxide also uses up the body's supply of vitamin C.

3. The gas, nitrogen oxide, is carcinogenic.
4. Tars are chemicals in smoke that are carcinogenic, and they can damage arterial walls, leading to heart disease.
5. Acetaldehyde is a toxic chemical known to be a cross-linker. As mentioned earlier, a cross-linker is a substance that causes uncontrolled, abnormal bonds between molecules. Wrinkled skin, hardening of the arteries, and emphysema are conditions caused, in large part, by cross-linking.
6. Lead, arsenic, and polonium are heavy metals which interfere with certain enzyme reactions in the body. The body's vitamin C is used up in protecting against these metals.
7. Nitrates and nitrites form carcinogenic nitrosamines. Vitamin C is used up in blocking the formation of nitrosamines.
8. The function of cilia is hampered. Cilia are hairs in bronchial tubes which keep foreign matter out of the lungs.
9. Smoke directly from the burning tobacco contains more carcinogenic materials than the smoke inhaled by the smoker. There is evidence which suggests that it could be more dangerous to be around a smoker than to be a smoker.

It is a natural human reaction to fight to save one's livelihood, even at the expense of the public's health.

Those people who have a vested interest in an issue will do what they can to protect that interest. When a person takes a position on an issue, one needs to know if that person has anything to gain from that position, so one can better judge the objectivity of the person's thinking. The food and tobacco industries have much to gain from the public perception that the consumption of their products is okay. Any research sponsored by them and other vested interests (including the health food industry) must be viewed with suspicion.

Although the influence of the food industry on the academic community might be substantial, sometimes leading to intellectual dishonesty, there are other possible reasons for the publication of invalid research. One must understand the tremendous pressure on university faculty to "publish or perish." In order to attain tenure at most universities, and to maintain one's position in good standing after getting tenure, professors must publish research and attract favorable attention from colleagues at other universities. There is only so much publication space to go around, however, and the competition for that space can be intense.

Because many journals receive many more manuscripts than they can publish, some have established a policy of not publishing papers which do not produce results attained at the 1% or 5% level of confidence (that means that there is either a 99% or 95% assurance that the results did not occur

due to chance). Therefore, if a professor spends several months doing experimental research in which the experimental treatment yielded no significant effect on whatever was being studied, the professor may have wasted all that time and effort, since his study might not be published. One has to wonder how often research results are deliberately "fudged" in order to meet the known journal policy. One also has to wonder about professors who establish reputations by piling up great numbers of publication credits. What is the quality of the research, both in terms of its validity and its consequence to the profession? Was it done mainly to establish an impressive publication record, or was it done to satisfy a need in the profession?

Researchers probably make mistakes quite frequently in the design and conduct of studies, and that leads to many false conclusions and conflicting results. One would hope that any errors in research methods and the judgments they influence could be dismissed as honest mistakes. There is certainly much room for that to be, given the complexities involved in the workings of the human body. But, human nature tells us that dishonesty is probably involved, too -- possibly to a significant degree. And that might lead one to ask why it can't be stamped out, if it really does exist to the extent indicated here. The problem lies with provability. Intellectual dishonesty in nutrition research cannot be proved any more than it can be proved that college

athletes take cash payments for playing at their schools. Unless one or both parties confesses to the deed you have nothing, legally. All you have is the strong suspicion that it must be going on.

Physicians, dieticians, teachers, and other people of influence usually base their beliefs on books and articles which, in turn, are based on research studies. They have to depend on the authors to present valid references, because the reader usually has no means to do that on his/her own. How can one be sure that the author carefully evaluated the studies presented, or even has the expertise to do so? That's a good question for which there is no real answer.

POINT NUMBER THREE: DOGMATISM INTERFERES WITH THE PURSUIT OF TRUTH

Dogmatism probably plays a significant role in the research and discussion of any issue. Once a person forms a firm opinion on something, and openly expresses it, it becomes very difficult to reverse it. One tends to look for evidence that supports one's view, and ignore or malign evidence that opposes one's view. It's just human nature to do so, and I'm not immune to it either. Furthermore, the same research results are subject to individual interpretation. Stimulated by the writings of Dr. Linus Pauling on the effects of vitamin C on the common cold, studies have been done to either confirm or deny his assertion that a relatively high daily consumption of the vitamin prevents colds. The results seem to indicate that

the taking of from one to five grams of vitamin C per day has no statistically significant effect on the occurrence of colds when compared to a control group. But, advocates of vitamin C supplementation use the same studies to reach a different conclusion. They point out that the takers of vitamin C had much milder symptoms which resulted in significantly fewer visits to the doctor's office and fewer days lost from work.

It is suspected by some that a perfectly valid piece of research can go unpublished because the findings do not conform to the beliefs of the people reviewing the paper. The peer review board's job is to judge a paper in several areas: (1) is the experimental design acceptable? (2) is the description of materials used and experimental method adequate for other researchers to duplicate the study? (3) are the conclusions reached justified relative to the data presented? Whether or not the review board likes the results should be irrelevant.

From the researcher's standpoint, I wonder how often people enter a study with an "axe to grind." How often are they out to prove that such and such is true or not true? Ideally, a researcher wants to take a disinterested view of the results, but that probably doesn't happen very often. How embarrassing it would be for someone who has voiced a strong opinion on an issue, to produce research results that run counter to that opinion. It would take a strong, non-

dogmatic person to submit such results for publication.

Let's look at a specific issue which might illustrate how dogmatism can enter into the dispute over the worth of nutritional supplements. For years and years now, the medical profession, the American Heart Association, agencies of the federal government, and the food industry have been telling us that one of the major causes of heart disease is an excess consumption of saturated fat and cholesterol. Actually, heart disease has a multi-faceted cause (stress, lack of exercise, smoking, alcohol consumption), but we hear most about cholesterol intake. There is plenty of evidence to suggest that cholesterol intake is not the major culprit in the cause of heart disease; yet, the aforementioned organizations keep pounding away at it, apparently ignoring the one big factor that appears to be most significant -- the nutritional status of the body's cells.

Cholesterol is actually a beneficial substance, and the body produces its own cholesterol in the liver and intestines. It is involved in many body processes, such as hormone production, vitamin D synthesis just below the skin, nerve impulse conduction, and so forth. Within reasonable limits, the body usually adjusts its cholesterol production to the amount that a person eats. High cholesterol intake leads to lower body production, and vice versa. Some years ago, many studies were done which concluded that a diet high in cholesterol leads to high blood cholesterol, and that high

blood cholesterol is highly associated with the onset of heart disease. Under certain conditions that is true, but it doesn't explain at least two facts. First, because of all the notoriety that a high-saturated fat diet has gotten in this country, egg, butter, and animal fat consumption has been down for decades, yet the incidence of heart disease has increased over that same period. Second, groups of people around the world have been identified as having high saturated fat diets, yet a low incidence of heart disease. Eskimos and the Punjabis of Northern India are two such groups. The traditional Eskimo diet is raw fat and meat, with the fat comprising 90% of the calories. The Punjabis eat nineteen times more fat than Southern Indians, yet their rate of heart disease is seven times less. Furthermore, the Punjabis eat primarily saturated fat, where the Southern Indians eat mainly unsaturated vegetable oils. How can all this be, if saturated fat intake leads to heart disease? The answer must be that there are other factors involved.

How does heart disease probably develop? Atherosclerosis (technical name for heart disease) occurs when plaques (tumors) form on artery walls. Materials tend to collect on the plaques, with cholesterol being one of the materials. Further, blood clots form on the plaques, and they can break off and lodge themselves in a narrower artery, totally blocking off the blood supply of that artery to the heart or

brain. When that happens in the brain, it is called a stroke.

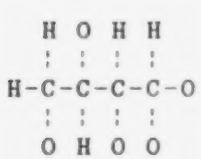
Several related mechanisms combine in causing atherosclerosis to occur. Free radicals, formed from fat oxidation and other processes, are capable of initiating plaque formation. Furthermore, the peroxidized fats suppress the very immune system which is designed to protect the arteries from plaque formation. One would think that the higher one's serum cholesterol, the better the chances of cholesterol attaching to the wall of the arteries. That's not necessarily so. It depends on which of the two types of cholesterol predominates in one's bloodstream. Cholesterol is carried around in the blood in the form of a fat-protein molecule (lipoprotein). There are two types -- HDL (high density lipoprotein) and LDL (low density lipoprotein). LDL deposits cholesterol onto the artery walls and HDL removes cholesterol from the artery walls. Factors involved in achieving a good HDL/LDL ratio are being female, exercise, not smoking, and a sound supply of nutrients in the body's cells. Because narrowed arteries make it more difficult for blood to go through, an hypoxic (low oxygen) state develops, which further influences the production of free radicals and reduces the production of PGI-2. PGI-2 is a hormone that naturally prevents blood clot formation. When it is reduced in supply, the blood's platelets have a tendency to stick together and form clots.

As long as a person's diet is good in other respects, the intake of saturated fat is not likely to lead to atherosclerosis. The taking of nutritional supplements seems to offer further protection from the free radical damage that leads to atherosclerosis. The anti-oxidant nutrients (vitamins A, C, E, B-1, B-5, B-6, amino acid cysteine, zinc, selenium) are particularly useful in that regard, as is clearly demonstrated in some animal experiments. In one study, two groups of rats were fed diets high in saturated fat. Both groups got grossly overweight, with one group getting heart disease. The other group didn't get heart disease, because its diet was heavily supplemented with nutrients. So the key to preventing heart disease seems to involve exercise and the eating of a good diet with nutritional supplementation. Whether or not one consumes saturated fat should be of little consequence. Eggs are not be be avoided. They are good food, even though they contain cholesterol.

The irony of the cholesterol and saturated fat scare is that doctors, dieticians, and agencies recommend that one's fat intake be more in the form of unsaturated fat. There is evidence to support the idea that unsaturated fat is even more dangerous than saturated fat.

Since unsaturated fat has in it more unsaturated fatty acids than saturated fat, there are more total spaces available for oxygen to attach to the carbon chain.

When a fat becomes oxidized, it is then a potential free radical. Free radicals have the potential to damage a cell's DNA and destroy the functioning of the cell and/or form a cancerous cell. The process is usually triggered by chemicals that get



that get into our bodies through inhalation, ingestion, and/or absorption. The chemical attacks the fatty acids stored in the body, causing them to be oxidized and turned into free radicals. Free radicals further cause damage to molecules in a chain reaction that, unless stopped by the immune system, leads to degenerative diseases, such as cancer, arthritis, and heart disease. Fat peroxidation is just one of several avenues for free radical formation. Free radicals can be formed directly from chemicals found in smoke and polluted air, from a chemical produced in the body as a result of alcohol consumption (acetaldehyde), from radiation (sunlight and x-rays), from an environment of too high or too low oxygen content, and from normal metabolic processes.

There is evidence to support the idea that degenerative diseases can be prevented or slowed down by reducing one's exposure to the damaging entities that cause them and by eating a good diet and taking nutritional supplements. The right nutrients in the right amounts substantially protect the body by keeping the immune system healthy and by directly deactivating free radicals. This has been indicated over and

over through experimental studies, yet the medical profession, most nutritionists, and most government agencies will not acknowledge that vitamin pills can be useful. For instance, selenium supplements alone can reduce cancer formation in animals by about 70%. People who live in cities where the drinking water is high in selenium have lower cancer rates than people in cities where the drinking water is low in selenium. Because of those facts the National Cancer Institute has recommended that people take a selenium supplement of about two hundred micrograms a day. The institute has tried, without success, to get government agencies to also recommend the taking of a selenium supplement. Such a recommendation, however, means that those agencies would have to abandon their long-standing position that everything you need to be healthy can be gotten from a well-balanced diet. In large part, dogmatism seems to prevent them from doing so.

POINT NUMBER FOUR: THE POLICIES AND PRONOUNCEMENTS OF GOVERNMENT AGENCIES ARE INFLUENCED BY THE SAME FACTORS THAT INFLUENCE NUTRITION RESEARCH.

What the government tells us about nutrition must be viewed with a wary eye, because it is heavily influenced by vested interests, dogmatic thinking, and political pressures. The very same people who could be accused of just about "working" for the food industry advise and sit on governmental committees which have much influence on public opinion and buying habits. They are suspected of simply

"parroting" official food industry positions. That situation is compounded by the revolving door relationships that exist between food companies and the very agencies that are charged with regulating them. It is common practice for a person to hold a position with a governmental regulating body for a few years, then take an executive position with a company that he/she was formerly entrusted to regulate. As well, industry people often shift over to government service. Earl Butz, one time Secretary of Agriculture, had previously served on the board of directors of Ralston-Purina. Butz's predecessor at Agriculture was Clifford Hardin, and he was on the board at Ralston-Purina after leaving the government. That's a conflict of interest, at least potentially, and it seems to run rampant throughout the government.

The Food and Nutrition Board of the National Academy of Sciences is a quasi-governmental body which sets the Recommended Dietary Allowances (RDAs) for many of the known nutrients. Daily intake of its recommended concentrations of twelve vitamins and six minerals is believed to be sufficient to maintain adequate health in most individuals. For the most part, the Board makes its periodic determinations by analyzing the nutrient content of what they consider to be a well-balanced diet, then adding a margin for safety. The scientists on the Board readily admit to uncertainties about their recommendations and the methods used to reach them. They further recognize that their recommendations are not

likely to establish maximum nutrient concentrations in the body's cells, and they do not rule out potential advantages for moderate nutrient intake beyond their recommendations.

The Board has its critics. Some scientists charge that the RDAs have nothing to do with optimal health, that they are merely designed to prevent observable disease. There is plenty of research evidence which indicates that people generally need nutrient levels which are much higher than the RDAs, and that it is difficult to reach even RDA levels through usual dietary intake.

Is the Board purposely setting RDA standards at low levels? What accounts for the sometimes significant variations in recommendations from one reporting period to another (the Board publishes revised editions every six years)? What possible motive could the Board have in manipulating RDA standards? Senator William Proxmire was once quoted as saying that the Food and Nutrition Board "is both the creature of the food industry and heavily financed by the food industry." He, as well as others, propose that low RDAs make the food industry's processed food look more nutritious than it is. A company can put on its product label numbers which indicate that the consumption of its product meets "x" percentage of the U.S.RDA for the nutrients listed. The lower the RDAs, the higher the percentages that can be claimed for a product.

The RDA for vitamin C is 60 mg. That appears to be

foolishly low. Consider that the National Research Council establishes nutrient requirements for laboratory animals. Several of the nutrient recommendations for animals range from four to thirteen times that for humans. Moreover, the standard lab chow put out by Ralston-Purina contains eighteen times as much vitamin C as for humans; and for monkeys, their chow is thirteen times higher in vitamin C than for humans. Supposedly, this is done in recognition of how important vitamin C is to the health of animals, and as a result of the knowledge that humans, apes, guinea pigs, and one type of bat and bird are the only animals THAT DO NOT produce vitamin C in their own bodies. Animals such as goats, cows, sheep, and dogs make a human equivalent of about ten grams of vitamin C a day. That's 10,000 mg, compared to the 60 mg recommended by the RDAs. When stressful conditions occur, those animals produce several times the normal amount. Why should man's needs for vitamin C be any different? Even apes and monkeys commonly consume one hundred times the vitamin C humans get in their diets.

Vitamin C might be the single most important nutrient that should be taken as a supplement, not only because humans don't manufacture it, but because it has so many known beneficial effects. Many experiments have been done to show that vitamin C stimulates the immune system to better kill bacteria, viruses, cancer cells, and free radicals. Part of this effect is due to vitamin C's stimulating effect on the

production of interferon (a substance produced by white cells which keeps viruses from penetrating the body's cells). Vitamin C also reduces serum cholesterol and reduces lipid formation on artery walls. It destroys seven chemicals associated with smoking and drinking, and it uses its anti-oxidant property to protect the nervous system from immediate and severe damage. The brain, spinal cord, and nerves contain a great deal of the very polyunsaturated fat Docosahexanoic Acid. The nervous system cells contain one hundred times the amount of vitamin C as is found in the circulating blood. If they didn't, that fat would quickly peroxidize.

The government agency that probably has the most significant effect on nutrition issues in this country is the Food and Drug Administration (FDA). The FDA is responsible for protecting us from harmful drugs and harmful ingredients in food and drink. In its role as public protector from worthless products, the FDA has taken a strong stand against the concept of taking vitamin pills.

In the 1960's, the FDA established the Recommended Daily Allowances (U.S.RDAs), which were based on the Food and Nutrition Board's RDAs. The basic purpose of the U.S.RDAs is to set an official governmental standard by which products can be evaluated and regulated. In an attempt to protect the unwary consumer from "useless" vitamin and mineral supplements, the FDA proposed a regulation that would

make vitamin pills in doses greater than 1.5 times the U.S.RDAs a prescription drug. That means a 100 mg vitamin C pill would require a prescription. Many people in this country routinely take vitamin C in doses of 500 mg or more. The FDA regulation further stipulated that no product could be classified as a food supplement if it exceeded the nutrient concentrations of the U.S.RDAs. Products containing between 100% and 150% of the U.S.RDAs were to be classified as non-prescription medications.

The FDA went even further. It intended to absolutely forbid any nutritional supplement company from making any health claims about its product on the product label. Manufacturers could not suggest that the American diet was nutritionally deficient; and, in place of any health claims, the following warning was to appear on the label.

> Vitamins and minerals are supplied in abundant amounts in the foods we eat. The Food and Nutrition Board of the National Research Council recommends that dietary needs be satisfied by foods. Except for persons with special medical needs, there is no scientific basis for recommending routine use of dietary supplements.

Fortunately, there was a storm of protest, both from the public and nutritional scientists. Members of the Food and Nutrition Board objected to having their reasoned opinions taken out of context and promoted as absolute truths. There are too many variables involved to absolutely claim that daily intake of nutritional supplements is useless for apparently healthy people. The public was outraged that

its individual nutritional needs were being determined and regulated by a government agency, and freedom to choose its own course of action would be restricted. In response to the massive public outcry, Congress blocked the FDA regulations.

Subsequently, the FDA has been able to establish several less threatening regulations, one of which prohibits the nutritional fortification of junk food and drink. If vitamin C were put into a soft drink, criminal action could be taken. Supposedly, the FDA doesn't want to condone or promote the eating of junk foods by making them better foods; but, the popularity of junk food is not declining and probably never will, regardless of what stance the FDA takes against them. So why not allow junk foods to become more nutritious?

The FDA claims that taking vitamin C and B tablets is a waste of money because those vitamins are water soluble and any excess is excreted in the urine. Water soluble vitamins cannot be appreciably stored in the body, as can fat soluble vitamins (A, D, E, K), so one must get them into the system on a regular basis for good health to be maintained. It is true that vitamins C and B are excreted in the urine, but that does not mean they are not needed. It just means that the full dosage taken can't be fully utilized at the time. Interestingly, experiments have shown that supposedly excess intake of vitamin C protects people from infections and

cancer of the urinary tract. In order to get the most out of, for instance, a 1,000 mg dose of vitamin C, it should be taken in smaller doses throughout the day. Percentage-wise, more of the vitamin will be utilized that way.

When one attempts to saturate the body's cells with nutrients, through the taking of vitamin pills, there must be some thought given to the possibility of overdosing on vitamins, called hypervitaminosis. The FDA often cites the potential for bodily harm in such instances. It is possible to oversupply the body with nutrients, especially in children, where irreversible damage can result. But, the body has ways of dealing with oversupply situations. As noted, when the cells are saturated with water soluble vitamins B and C, the excess is simply excreted in the urine with no apparent harm. When saturation of the fat soluble vitamins A, D, E, and K, occurs, excesses are stored in the liver, to be used when needed. Although an overdose situation is possible with the fat soluble vitamins, it is highly improbable. Symptoms of vitamin A toxicity typically occur only after a single dose of 2,000,000 IU or prolonged doses of more than 100,000 IU per day. The U.S.RDA for vitamin A is only 5,000 IU; so one would have to take twenty times that amount for months before symptoms of hypervitaminosis appeared. And, once the symptoms appear, the simple stoppage or reduction of intake resolves the

problem with no apparent harm. Few, if any, people have ever died from a vitamin overdose.

The dangers of hypervitaminosis are absurd when compared to the daily mistakes made with prescription drugs and surgery. Iatrogenic disease is a physician-caused phenomenon which accounts for 180,000 American deaths per year, not to mention the many other people who are injured. It is estimated that fifty percent of all surgery done in this country is unnecessary. Allergic reactions to antibiotics kill thirty thousand people per year, and one American dies every three days from aspirin. Furthermore, the taking of drugs actually increases the body's need for nutrients, because the enzymes that the liver uses to process the drugs out of the body depend on nutrients for effective function. For example, oral contraceptives elevate the body's needs for vitamins B-6, folic acid, C, and E. Extra vitamin C is required for aspirin. Vitamins A, D, K, and B-12 are needed to offset the taking of cholesterol-reducing drugs. And, illegal drugs, such as cocaine, use up vitamins A and C. It seems that medical and governmental authorities should be more alarmed at the prospects of drugs and surgery doing harm to the public than the intake of supplementary vitamins.

The FDA seems to be a roadblock in relation to drugs, too. Their regulations are so strict for the approval of a new drug that many useful drugs never get to the market place. It takes about ten years and fifty-seven million

dollars (as of 1982) to get a drug through all the development and testing that the FDA requires. Then, if a new use is found for the previously approved drug, the company cannot inform physicians, pharmacists, or consumers of the new use until the FDA goes through a lengthy approval process. In the meantime, companies sometimes give up because of the expense, and doctors' patients die or needlessly suffer.

Now, you might say it's good that the FDA is so careful. But, in reality, it might not be all that good. Dr. A. Schmidt, a former FDA commissioner says, "...failure to approve an important new drug can be as detrimental to the public health as the approval of a potentially bad drug." If, under less stringent regulations, the FDA were to approve a bad drug, it would become evident soon enough, and the drug would be taken off the market. But, what would also happen is that the FDA's reputation would be damaged. It is politically safer to fail to pass a good drug than to allow a bad drug to leak through the system, even though the good drug might save many, many lives, or at least reduce people's suffering. Dr. Herbert Ley, a former commissioner of the FDA, once said, "the thing that bugs me is that the people think the FDA is protecting them -- it isn't. What the FDA is doing and what the public thinks it's doing are as different as night and day." One has to believe that the FDA generally acts in the public interest; but, at times, the

FDA's conservative approach seems to do more harm than good.

Another federal agency, which you would think has nothing to do with food and nutrition, has also gotten into the act. The Bureau of Alcohol, Tobacco, and Firearms prevents alcohol distillers from adding nutrients to their products, which would make them safer for human consumption. A good many physicians and biochemists agree that such supplementation would significantly reduce the damaging effects that alcohol has on the body.

There are two related occurrences involved here. One deals with the kind of damage that alcohol does to the body. The other involves the circumstances that lead to a person's becoming a physiological alcoholic, as opposed to a psychic alcoholic. Psychic dependence is like wanting an ice cream cone every day, but your body doesn't really need it. A physical dependence, which is involved in true alcoholism, means that the body actually signals for the alcohol, just as your body signals for food when you're hungry.

One damaging effect of alcohol is the same as for sugar. Alcohol has no nutrients with which to process it through the body, so alcohol must steal from the body's supply. That has an effect over the long haul. There is, however, a more dramatic, short term effect that is clearly traceable.

All humans make about one ounce of alcohol every day as a result of normal metabolism. In the liver, special enzymes metabolize the alcohol into acetaldehyde. Left alone,

acetaldehyde is a very dangerous substance. It can oxidize to form free radicals, and free radicals can cause cross-linking, cancer, birth defects, atherosclerosis, brain damage, and so forth. The body has a system for getting rid of the acetaldehyde, with enzymes turning it into a harmless substance (acetate). However, the system can break down due to a possible combination of three factors -- long term heavy drinking, a deficient nutritional intake, and an inherited metabolic defect.

People drink for essentially the same reason that people smoke and take tranquilizers. Those substances act as stimulus barriers. They make people feel better than they otherwise would. When a person drinks alcohol frequently, and in large quantities, acetaldehyde can be made faster than the body can get rid of it. Therefore, free radicals are produced. The body can largely prevent damage from occurring if it has sufficient amounts of the right nutrients. In an experiment, two groups of rats were given equal amounts of acetaldehyde. Ninety percent of one group died, while in the other group, no rats died. The latter group got supplemental doses of the vitamins B-1 and C and the amino acid cysteine.

In the presence of a nutritional deficiency, continual alcohol intake breaks the system down to the point that alcoholism results. The production of more and more acetaldehyde develops into a physiological need for more and

more alcohol. At least part of the process is due to the fact that alcohol, in itself, actually acts as a destroyer of the free radicals produced by the oxidation of the acetaldehyde. So, a vicious cycle results. Alcohol produces a problem, but the body wants more alcohol to help solve the problem that the alcohol produced in the first place. And to make matters worse, the alcoholic's caloric intake becomes dominated by alcohol rather than good food. So the alcoholic drinks more and eats less, further compounding the problem.

It's important to realize that alcoholism is not so much a psychological problem, a problem of lack of will power, as it is a nutritional problem. In one experiment, three groups of rats were fed diets that were either nutritionally deficient, adequate, or superior. In each rat's cage were two containers of liquid -- one containing pure water and one containing a water-alcohol mixture. The nutritionally deficient group of rats voluntarily drank mainly from the alcohol dish, while the well-fed rats didn't touch the alcohol at all. The middle group drank a moderate amount of alcohol. The point is that man's biological desire for alcohol is affected by the nutritional status of his body's cells. It seems virtually impossible for a nutritionally sound individual to become an alcoholic.

Only five to ten percent of all regular drinkers become alcoholics, but certain groups of people seem to have a higher percentage than normal. The Irish and American Indian

are two such groups. It has been found that these people have a metabolic defect which makes them more susceptible to alcoholism. They have a higher than normal average ratio of acetaldehyde-producing to acetaldehyde-destroying enzymes. So when they drink, those people have a tendency to produce greater than normal amounts of acetaldehyde, but they can only destroy them at a slower than normal rate. Heredity is against them, so they definitely need nutritional protection against the alcoholic process.

One final note on this subject: you might remember, in the discussion about smoking, that tobacco smoke has in it acetaldehyde, among other chemicals. A great many people smoke and drink, and the damaging effects of both together have been found to be worse that additive. The risks of cancer and heart disease go way up for those people, as their cells' levels of the anti-oxidant nutrients go way down. More than anyone else, smokers and alcohol abusers need nutritional supplementation to counteract that self-pollution.

POINT NUMBER FIVE: BEWARE OF PROPAGANDA AND QUACKERY

Organizations and food companies publish literature on nutrition which supports their viewpoints. Pamphlets and booklets often turn up at professional conferences. They are targeted toward people (teachers, for example) who are in positions to influence other people. For the most part, the information seems to be reliable. But, there are some

instances where the information takes on a propaganda tone, supporting a nearly indefensible position which is to the benefit of food companies which produce certain processed foods. As an example, one can frequently find statements to this effect: "Nutritionally speaking, enriched breads are equivalent to whole grain." That statement was made by a professor of nutrition at Harvard University. It could have been made by many other "experts" in the field. The statement seems crazy when you look at what happens when whole grain is processed into what amounts to white flour.

A whole wheat kernel has three parts -- endosperm (mostly starch), germ (contains most of the nutrients), and bran (outer covering of kernel, has nutrients and fiber). When the kernel is refined, most of the germ and bran are taken out. The process produces an easier to digest flour, but it also produces a product which is deficient nutritionally and mechanically. The nutrient loss in refined flour is as follows: thiamine (77.1%), riboflavin (80%), niacin (80.8%), pantothenic acid (50%), pyridoxine (71.8%), vitamin E (86.3%), calcium (60%), phosphorus (70.9%), magnesium (84.7%), potassium (77%), sodium (78.3%), chromium (40%), manganese (85.8%), iron (75.6%), cobalt (88.5%), copper (67.9%), zinc (77.7%), selenium (15.9%), and molybdenum (48%). Nineteen nutrients are reduced from their original concentrations, and only four (thiamine, riboflavin, niacin, and iron) are restored to their original values in

the enrichment process. How can it be that enriched flour is as good as whole grain when fifteen nutrients are severely reduced in supply, in most cases? Furthermore, much of the fiber is lost in refining, and while it is not a nutrient, per se, fiber is a mechanical necessity. It absorbs water as it passes through the digestive tract, making feces soft and easier to eliminate. Fiber has also been found to absorb some environmental pollutants, which are then carried out of the body. Too little fiber in the diet leads to constipation, which means that the feces hang out in the colon longer than normal. Over the long haul, that can lead to problems such as diverticulosis and cancer of the colon.

If refined flour is nutritionally equal to whole grain, why do bread manufacturers go to so much trouble to disguise the fact that their products contain refined flour? Many breads list as ingredients the words unbleached, enriched, fortified (four nutrients supplemented beyond the grain's original quantity), wheat, and rye flour. The implication is that the bread is not made with refined flour, but those are all refined flours. If the ingredients and the label do not say 100% whole wheat or whole grain flour, then it's not the real thing. A bread can be labeled (named) whole wheat bread and still have 49% refined flour in it.

Another difficulty involves the significant amounts of sugar that are injected into some breads. Ingredients on a label are listed in order of quantity, such that the first

ingredient is most plentiful, the second is second-most plentiful, and so forth. A little sugar is required to raise dough, but when extra sugar is put into bread to make it taste better, manufacturers often try to disguise the amount by using several kinds of sugars. They can then place them further down the list of ingredients than if only one sugar were used. Corn syrup, maple syrup, raisin syrup, brown sugar, honey, malt, molasses, dextrose, sucrose, fructose, and glucose are all sugars, and they all have approximately the same detrimental effects on the body.

Recent public concern over dietary fiber has led to the injection of powdered wood pulp into some breads. Wood pulp absorbs a lot of water, so the main ingredient of the bread turns out to be water. Furthermore, the human intestinal tract is not designed to handle wood pulp, so irritated intestines could easily result from eating substantial quantities of that kind of bread. As a final insult, the manufacturers have put a high price on the bread, even though it is cheaper to make than regular bread. One might also be suspicious of dark breads, such as pumpernickel. For the most part, they are nothing more than refined products that have been colored with caramel. That makes them look more nutritious than they really are.

In general, the same comments that were just made about bread could be made about cereals. You've got to read labels to make sure what you're getting. Sugar is more of an issue

with cereals than with bread, because we're talking about huge amounts, in some cases. Sugar Smacks are 63.7% sugar, Sugar Pops are 40.7% sugar, and King Vitaman is 61.6% sugar. Even some of the more nutritious cereals have a suspiciously large amount of sugar content. Heartland (a granola) has 26.3%, Grape Nuts is 7.7%, Wheaties is 8.9%, and Total is 9.4% sugar. Cereal companies are quick to counter any criticism about sugar in cereal and any charges that sugar is detrimental to one's health. General Mills puts out a pamphlet which denies that sugar in cereals contributes to tooth decay, obesity, and other diseases.

Thus far, this presentation has been heavily weighted in favor of what one might call the health food industry -- the people most responsible for selling nutritional supplements to the public. Since they have something to sell, aren't they also guilty of many of the same things that have been mentioned of the other side? The answer is yes. I'll cite two instances.

For years and years, an argument has raged between the scientific community and people who write articles for popular nutrition magazines about the relative worth of natural and synthetic vitamins. Some writers have repeatedly claimed that natural vitamins are better than synthetic because they are better absorbed and utilized by the body. That statement is made despite irrefutable evidence and agreement among scientists that, for example, a synthetic

vitamin C molecule (manufactured in a lab) is exactly the same as the one made by a plant. Both have the same potential for biological activity because the human body cannot tell the difference. It could be argued that vitamin C, as well as some other nutrients, occurs in nature with other nutrients that enhance its biological activity. That is true, particularly in the case of vitamin C.

Bioflavonoids accompany vitamin C in fruits and vegetables. When you peel an orange you note the white stuff on the inside of the skin that sticks onto the meat of the orange, and you probably try to get as much of it off as possible before eating the orange. That's where most of the bioflavonoids are. It's not a good idea to take the white stuff off completely, because the bioflavonoids significantly enhance the biological activity of the ascorbic acid (vitamin C) in a synergistic relationship. That natural, synergistic effect, however, is not limited to nature. It can be reproduced in the laboratory. So, a 150 mg vitamin C tablet which contains bioflavonoids can have equal or greater biological activity than a 500 mg tablet of vitamin C alone.

The irony of the natural versus synthetic controversy is that the natural product must, for economic reasons, be more than 95% synthetic. Have you ever noticed on the label of a vitamin C bottle this wording: 500 mg of ascorbic acid with acerola cherries or with rose hips? You would think it would say from either one. There's a good reason for that.

There is so little vitamin C in natural sources that it would cost more than a dollar per gram to extract it from plants. That would make the cost of purely natural vitamin C prohibitive. Therefore, the "natural" vitamin manufacturers must resort to a nearly 100% synthetic product anyway. Adding five percent natural source allows them to call it natural, and it adds to the cost.

Another example of a substance which the body needs, but cannot tell the difference between the natural and synthetic versions, is Na-PCA. It was once believed that skin was kept soft because of its oil content. Actually, it's the water content of the skin that makes it soft; and the substance in the skin that holds the water in is Na-PCA. The body makes its own, but if your body doesn't make enough (this happens when you age), or you wash your hands too frequently (the Na-PCA washes away), you can add it to the skin externally. The body can't tell the difference between its own Na-PCA and that which is contained in some moisturizing creams.

Natural food proponents have a tendency to reject the idea of putting preservatives in food. "If it isn't natural, it can't be good." Actually, food preservatives serve a very healthful purpose. Without them, food could not be safely stored and transported and consumed by us. BHT and BHA are two such preservatives. They are anti-oxidants because they prevent fats and oils from becoming rancid (oxidized into mutagens and carcinogens by oxidants such as oxygen, ozone,

and free radicals). BHT and BHA are added both to the food and the packaging materials that surround them, and any toxic effects that they might have (and in the quantity typically consumed there really are none) are far, far less of a threat to health than food which is spoiled or contains bacteria and mold. Common preservatives which can be found on food labels, and which can prevent the formation of powerful toxins such as botulism and aflatoxin, are calcium propionate, sorbic acid, sodium nitrate and nitrite, and benzoic acid. Cloves, sage, oregano, rosemary, frankincense, and myrrh are all anti-oxidants. There is every reason to put preservatives in our food.

POINT NUMBER SIX: A WELL-BALANCED DIET IS NOT NECESSARILY THE BEST DIET, AND IT DOESN'T BENEFIT ALL PEOPLE EQUALLY

Most doctors, dieticians, nutritionists, and governmental agencies claim that nutritional supplements aren't necessary as long as a well-balanced diet is eaten. There are at least eight weaknesses in that position.

1. A well-balanced diet is considered to be one in which a person eats from the four basic food groups on a daily basis. Although it is recommended that foods be consumed as much as possible in their natural states, foods such as mashed potatoes, canned and frozen vegetables, white bread, and processed cereals are all considered to be a part of a well-balanced diet. Yet, they are nutritionally deficient when compared to food in its

original state. In that light, a well-balanced diet is not necessarily the best diet a person could eat. So, people who think they are eating well might not be eating as well as they could for optimal health. Nutritional supplements could make up the difference.

2. Closely related to the above comment is this question. Practically speaking, how many people actually eat a well-balanced diet? Since the United States is one of the world leaders in the incidence of degenerative disease, it is reasonable to suspect that hardly anyone does. This is the case despite constant urging by the health and medical communities to eat good food. If people, in general, are not eating well-balanced diets, (and there is good reason to suspect that they never will), doesn't it make sense to advocate the taking of nutritional supplements?

3. Even if one eats a natural foods diet, the nutrient content of "fresh" fruits and vegetables has gone down over the years. Some crops are picked prematurely so they won't spoil by the time they are presented to us in the grocery store. Fruits and vegetables must mature on the plant or tree to maximize their nutrient contents. Furthermore, even crops picked at maturity (lettuce, for example) begin to lose some of their original vitamin C content as soon as they are cut or picked.

4. Personal circumstances have an influence on people's nutritional needs. If you could take two people who are exactly alike in every way, and who eat what would be considered the perfect diet, and place them into different lifestyle situations, would they not eventually become different in the nutritional status of their respective body's cells? If one of the two were subjected to years of pollution and stress, while the other were not, surely their relative health statuses would become different eventually. It would seem that the only way the "stressed" individual could retain nutritional equality with the other is to take nutritional supplements. When you consider that virtually no one eats a perfect diet, and that virtually everyone encounters nutrient-depleting circumstances throughout his/her lifetime, it seems foolish to think that optimal health and longevity could be attained without taking supplements.

5. Nowhere in nature has there ever been found an organism which gets optimal nutrition from its natural environment. Experimental results indicate this.
   For example, a plant which receives a certain concentration of carbon dioxide in nature can be taken into a laboratory and given a higher than normal concentration of carbon dioxide. The plant grows faster and bigger. Plants given ideal sunlight, temperature, water, and

minerals also grow better. Why would man be any different? Why would he be singled out in nature to get optimal nutrition from his environment? Even rats, which manufacture their own vitamin C, have been shown to benefit from vitamin C supplements. In stress experiments, rats given vitamin C survive greater stresses than those who do not get it. It appears that nutrition can always be improved.

6. It is a well-known medical observation that people who suffer from vitamin deficiency diseases, such as scurvy and pellagra, often develop a rather permanent need for the deficient nutrient at a higher than normal level. Once pellagra victims are treated to the point their symptoms disappear, they must ingest about thirty times the U.S.RDA for niacin per day for years to prevent the recurrence of their symptoms. Pernicious anemia victims must consume about sixty times the U.S.RDA for vitamin B-12 to remain healthy, and scurvy victims must take in more than twenty times the U.S.RDA for vitamin C. Very few people in this country ever develop a singular vitamin deficiency disease; but, it is likely that many people experience significant periods of what could be called sub-clinical deficiencies, whereby one's nutritional status is definitely sub-optimal and bordering on a recognizable deficiency state. It may be that long-term sub-clinical deficiencies also stimulate a

permanent elevation in nutritional needs -- needs that can't be satisfied by diet alone.

7. You've heard the phrase, "one man's food is another man's poison." We know instinctively that each person is different from the next, but it's interesting to focus on the degree to which that is so. The size and shape of every organ in the body is not necessarily as standard as seen in an anatomy book. Tremendous differences exist between people. Have you ever wondered how a small person could eat more food than a bigger person? The likely reason is that the small person's stomach is larger than average, while the larger person's stomach is smaller than average. There may be two, three, or four arterial branches coming off a person's aorta. A muscle in the hand might insert to two fingers instead of just one, making it impossible for the person to move either finger individually. There are also differences in people's abilities to digest, absorb, and utilize the food they eat. That means that two people could eat exactly the same diet but get entirely different nutritional benefits. THIS IS A MAJOR, MAJOR POINT. Those who advocate that one need only eat a well-balanced diet to be healthy assume that one's food is automatically processed through the body. It isn't. Tremendous differences exist in people's metabolic capacities.

8. Related to the previous point is the concept of bio- biochemical individuality. Experiments have been conducted in which animals have been fed and treated exactly alike, yet their growth rates and lifespans varied widely. Practically speaking, no two people are alike in nutritional needs. We all need the same nutrients, but it is likely that almost everyone has unusually high needs for one or more nutrients. Think back to the food handling mistakes that led to scurvy, beriberi, and pellagra. Many people died from those diseases, but not all, because some people's needs for thiamine, niacin, or vitamin C were not great enough to be fatally affected by the deficiency in the food. My need for calcium might be five, ten, or twenty times that of someone else. Since nutrients work as a team, the consistent under-supply of just one nutrient can lead to degenerative disease. Because of that probability, it makes sense to take nutritional supplements as an insurance policy against the biochemical individuality factor.

A CONCLUDING COMMENT

Through the thousands of years man has been on this planet he has eaten the foods that nature provides. Although the nutrition nature provides can be improved upon, it is silly to think that we can go in the opposite direction with

impunity. The processing of food, although advantageous in many ways, hurts us. We cannot possibly get the same nutritional benefits from processed foods as from natural foods. Nowadays, people who eat natural foods and take nutritional supplements are thought to be health nuts -- people who are on some sort of crazy diet. Isn't it interesting how things can get turned around? If we were to take a frozen TV dinner up into the mountains of Northern India and tell the Hunzas that this is good food, they would think we were crazy.

The most stable population groups throughout history have eaten from five food groups -- mostly grains; a slightly smaller amount of vegetables; a smaller amount of legumes (peas, beans, lentils, peanuts); yet smaller amounts of seeds, nuts, and fruits; and varying amounts of animal flesh and products. Generally, the food has been consumed in its natural state. In the times in which we live, the probability of our eating truly good diets is remote. Our lifestyles generally don't permit it. Although we should try to eat good food in reasonable variety, to exercise in carrying out our daily duties, to eat only when our bodies signal for food, to avoid emotional stress, and to avoid environmental and self-pollution of our bodies, we often can't do those things very well. Simply harping about eating well-balanced diets isn't going to cut it. We probably need nutritional supplements to defend ourselves from ourselves.

But, there is a caution. Good health and longevity depend on many factors, with cellular nutrition being just one of those factors. Furthermore, the taking of nutritional supplements is not license to ignore good eating habits. One must always strive to eat the best food that one's circumstances will allow. The reasonable goal of any nutritional supplemental regimen should be to saturate the body's cells with all the nutrients to allow the cells to function at maximum efficiency. It must be understood that the attainment of that goal provides no guarantee of immunity from disease or cure of disease. There are limitations to the preventive and healing powers of the human body, even when supplied with ideal materials. Some damage is unavoidable and irreversible. Since the health benefits from nutritional supplementation must necessarily vary from one individual to another, the only certainty involved with cellular saturation is that good health won't be limited because one's cells are not supplied with optimal levels of the nutrients they need.

Although the medical profession and most scientists strongly question the value of nutritional supplementation for most people, one can look back in history and find many instances where unorthodox ideas that contradicted the notions of scientific truth held by academicians and bureaucrats later became accepted practice. There is no proof, beyond doubt, that the taking of vitamin pills will

benefit the human population as a whole. But, there is good reason to suspect that supplements might help most people. So what are we to do -- wait for the proof to come in, if it ever does? In the meantime, we could be needlessly shortening the quality and length of our lives. Anyone who personally dismisses the value of taking vitamin pills is really saying one of two things -- that his/her food intake and lifestyle allows the body's cells to enjoy optimal concentrations of all the nutrients they need (a highly unlikely circumstance); or, that he/she doesn't particularly care whether or not the cells are maximally nourished. Taking vitamin pills is a simple, inexpensive, and virtually harmless undertaking. Doesn't it make sense to offer our bodies nutritional insurance?

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